NNSA chief Linton Brooks, Labs Director Tom Hunter introduce Red Storm supercomputer to news media, public

NNSA administrator also touts reliable replacement warhead concept

DURING A NEWS CONFERENCE at Sandia, NNSA Administrator Linton Brooks discusses the unique capabilities of Sandia's new Red Storm supercomputer. In his remarks to the media, Brooks announced that in two of six key benchmark tests, Red Storm has been measured as the fastest computer in the world. Behind Brooks is a visualization created by Red Storm of how a specific fire event might affect a weapon. (Photo by Randy Montoya)

By Bill Murphy

In a day that highlighted Sandia's up-and-running Red Storm supercomputer — the fastest in the world in two critical benchmark tests, if not in raw speed — NNSA Administrator Linton Brooks told members of the media that the DOE/NNSA weapons complex is "on the verge of making some fairly major changes in the way we maintain the safety, security, and reliability of the nuclear weapons stockpile."

"We're looking toward a smaller, transformed stockpile that is based around a concept called the reliable replacement warhead," Brooks said during a Feb. 8 media event in the Vislab in Sandia's Joint Computational Engineering Lab. The RRW concept, he said, hinges on responsive infrastructure and production and design capabilities.

"We can think about these dramatic advances," Brooks said, because of the high quality of the talent at Sandia and the other weapons labs — *and* because of the availability of modern computers."

Labs Director Tom Hunter, who introduced Ambassador Brooks to reporters, lauded NNSA for its role in funding and supporting investment in

(Continued on page 4)

Sandia could have "huge role" in reliable replacement warhead program, Brooks says. See story on **page 4.**

In observance of National Engineers Week, the *Lab News* invited Sandia engineer, author, and historian John Taylor to write a brief survey of notable engineering accomplishments through the ages. His story is on **pages 6-7**. Sandia Chief Engineer and Executive VP John Stichman also weighs in with a perspective on Sandia's engineering culture. John's comments are on **page 8**, as is a story highlighting the accomplishments of Eliot Fang, who will be honored as the Asian American Engineer of the Year by the Chinese Institute of Engineers/USA during National Engineers Week.

Sandia LabNews

Vol. 58, No. 4 February 17, 2006

Managed by Lockheed Martin for the National Nuclear Security Administration

Sandia National Laboratories

Norm Jarvis assists with security for 2006 Winter Olympic Games

Former US Secret Service agent worked with four presidents

By Michael Padilla

As a one-time member of the White House Secret Service detail, Norm Jarvis worked on security preparations for major presidential events around the world.

Now retired from the Secret Service and serving as manager of Sandia's Security Operations Dept. 5997, he consults with the United Nations on security for major events and mass gatherings and provided his expertise to the security preparations for the 2006 Winter Olympic Games in Torino, Italy, now under way.

More specifically, Norm serves as the American expert on the advisory committee for the United Nations Interregional Criminal Justice Research Institute (UNICRI)-Europol, International Permanent Observatory. The committee was established to help improve international cooperation on security measures — in particular on terrorism prevention — during major world events.

For the past several months Norm has been working closely with foreign governments during Olympic security preparation. As an advisor he has met with host officials to determine the nature and scope of the event and to discuss available resources, technology, training, and planning expertise.

Olympic organizers are aware of the heightened concern of terrorism and other concerns at the event, Norm says, such as possible

(Continued on page 5)

DuPont safety report challenges Labs to bolster ES&H culture

Commissioned study identifies ways Sandia can improve safety

By Chris Burroughs

Sandians face challenges to make the Labs a safer place to work, a recently released report by DuPont Safety Resources says. The DuPont company conducted a site review and employee survey last summer to identify how Sandia's safety statistics and culture can be improved.

"Compared to other DOE sites, Sandia has generally shown higher injury rates with little improvement over the last five years," the report notes.

Of total recordable injuries per 200,000 workhours in FY 2004, the average of DOE sites in the complex, including research labs, was 1.7. Among the nuclear weapons laboratories, Los Alamos National Laboratory's rate was 2.1, Lawrence Livermore's was 2.2, and Sandia's was 2.6. (The source of the figures used in the report was the DOE's Occupational Injuries & Illnesses Annual Fiscal Year Summary Statistics, October 2003-September 2004.) A 2.6 rate of total recordable injuries at Sandia represented 265 people suffer-

(Continued on page 4)

Inside . . .

Labs Director Tom Hunter to host all-hands meeting Feb. 22

Labs President and Director Tom Hunter will conduct an all-hands meeting Wednesday, Feb. 22, at the Steve Schiff Auditorium from 9-10:30 a.m. For more details about the session, watch upcoming *Sandia Daily News*.

The all-hands meeting, which will emphasize employee dialogue, comes the day before Tom delivers the annual State of the Labs address to members of the community. In celebration of Albuquerque's 300th birthday, the theme for the community address is "Sandia and Albuquerque: Growing Up Together."

What's what

If it hasn't occurred to you before, think for a moment about the fact that everything ever made has involved engineering of some sort, to one extent or another. Human muscle moving stone and plants to get at edibles, and to improvise shelter; flaking flint; binding stone to wood; using one object to move another — all engineering. Generation after generation improving on those basics got us to cultivation, buildings, transportation, and myriad other developments, right to today's space travel, iPods, microwave ovens, and all the other familiar facets of our time.

With that in mind, the *Lab News* salutes National Engineers Week — Feb. 19-25 — in this issue with John Taylor's fine read on the history of engineering, Deputy Laboratories Director John Stichman's thoughts on the culture of engineering at Sandia, and Iris Aboytes' profile of Asian American Engineer of the Year Award winner Eliot Fang.

It's all about our world. Don't miss it, starting on pages 6 and 7.

* * *

Unless you've been in a cave somewhere for the past few months, you've heard all the back-and-forth about the propriety of National Security Agency monitoring of phone calls as part of the effort to head off the plans of terrorists before they can blow us up. It's a touchy subject for Americans, with our long traditions of privacy.

HE CAN DO IT. CAN YOU?

Thinking about this made me wonder just what we do in private that we wouldn't want others to see or hear. Nothing seditious; nothing treasonous. But think about it: Would you like someone to see you standing in front of a mirror, your face contorted as you try to form the Spock/Vulcan "Live long and prosper" sign? Or trying to touch the tip of your nose with your tongue or wiggle your ears or knot a cherry stem with your tongue? How about singing at the top of your lungs in the car in traffic, or dancing around solo at home to a reggae song? Face it, we're no threat to Frank Sinatra or Madonna or Bob Marley.

No threats to national security either.

Privacy doesn't have to be about national security. More often than not, for most of us, it's more like Linus's security blanket.

* * *

The query about Sandia's oldest buildings brought a note from retiree Peggy Poulsen, who e-mailed that she started at Sandia in the spring of 1948 and about a month later was transferred into the office of then-Labs Director Paul Larsen. That was in a wooden building in the northwest part of the tech area, she wrote.

"It wasn't too long before Bldg. 800 was finished and we moved into offices on the north end of the second story," she said. "They were the most elaborate offices in the labs at that time and everyone was coming upstairs to take a look at them. . . . I'm not sure Bldg. 800 was the first, but it was certainly one of the first new buildings in the tech area."

— Howard Kercheval (844-7842, MS 0165, hckerch@sandia.gov)

Sandia LabNews

Sandia National Laboratories

http://www.sandia.gov/LabNews

Albuquerque, New Mexico 87185-0165
Livermore, California 94550-0969
Tonopah, Nevada • Nevada Test Site • Amarillo, Texas •
Carlsbad, New Mexico • Washington, D.C.

Sandia National Laboratories is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin company, for the US Department of Energy's National Nuclear Security Administration.

Ken Frazier, Editor 505/844-6210
Bill Murphy, Writer. 505/845-0845
Chris Burroughs, Writer. 505/844-0948
Randy Montoya, Photographer 505/844-5605
Nancy Garcia, California site contact. 925/294-2932

Contributors: Janet Carpenter (844-7841), John German (844-5199), Neal Singer (845-7078), Larry Perrine (845-8511), Howard Kercheval (columnist, 844-7842), Will Keener (844-1690), Iris Aboytes (844-2282), Michael Padilla (284-5325), Julie Hall (284-7761), Rod Geer (844-6601), Michael Lanigan (844-2297), and Michelle Fleming (Ads, Milepost photos, 844-4902). Erin Gardner (intern, 284-8432), Darrick Hurst (intern, 844-8009). Dept. 3651 Manager: Chris Miller (844-0587).

Lab News fax 505/844-0645
Classified ads 505/844-4902

Published on alternate Fridays by Media Relations and Communications Dept. 3651, MS 0165

LOCKHEED MARTIN

Lab News Reader Service

The *Sandia Lab News* is distributed in-house to all Sandia employees and on-site contractors and mailed to all Sandia retirees. It is also mailed to individuals in industry, government, academia, nonprofit organizations, media, and private life who request it.

Retirees (only):

To notify of changes in address, contact Carol Wade, Benefits Dept. 3332, at 505-845-9705, e-mail cawade@sandia.gov, or Mail Stop 1021, Sandia National Laboratories, Albuquerque, NM 87185-1021.

Others:

To receive the *Lab News* or to change the address (except retirees), contact Michelle Fleming, Media Relations and Communications Dept. 3651, 505-844-4902, e-mail meflemi@sandia.gov, or Mail Stop 0165, Sandia National Laboratories, Albuquerque, NM 87185-0165.

Employees:

To change the number of copies of the *Lab News* your Mail Stop is receiving please call Honario Anaya, Mail Services Team 10268-4, at 844-3796. At Sandia/California contact the Mail Room at 294-2427.

Web Users:

The *Lab News* is on the Web at www.sandia.gov/LabNews.

Five Sandians recognized for 'Setting the Standard' in ethical business conduct

By Iris Aboytes

Five Sandians were recently recognized by the Laboratory Leadership team by nomination for The Chairman's Award honoring "extraordinary actions or behavior" that exemplify the Lockheed Martin commitment to "Setting the Standard" for ethical business conduct and integrity.

Susan Rhodes (6958) was selected as the Sandia nominee and, ultimately, the Lockheed Martin Information & Technology Services nominee for the 2006 Chairman's Award. Susan is the department manger of International Ports and Maritime Security. The other nominees were: Paul Pickard (6872), Rosemary Dunivan (10541), Fran Nimick (6140), and James Eanes (10245).

They were nominated for identifying, correcting, or resolving complex ethical issues, enhancing the corporation's image and reputation for ethical business conduct, or exhibiting determination to do the right thing by placing Lockheed Martin's values and ethical principles above personal interest.

Susan was presented with a certificate for her leadership in exemplifying the corporation's commitment for ethical business conduct and integrity. She also received a personal note from Lockheed Martin Executive Vice President Michael Camardo, who thanked her on behalf of the 40,000 men and women of Lockheed Martin Information & Technology Services.

Recent Retirees

Retiring and not seen in *Lab News* pictures: Carlos Gonzales (4211), 21 years; Duane Carr (4211), 22 years; Gina Terrazas (10730), 12 years.

Recent Patents

David Wick (6646): Active Optical Zoom System.

Arlee Smith and Darrell Armstrong (both 1128): Self-Seeding Ring Optical Parametric Oscillator.

Scott Bisson and Tom Kulp (both 8368): Tunable Light Source for Use in Photoacoustic Spectrometers

Timothy Shepodd (8762), Jason Rehm, Ernest Hasselbrink Jr., and Brian Kirby: Mobile Monolithic Polymer Elements for Flow Control in Microfluidic Devices.

Lenny Klebanoff (8757), Dan Rader (1512), and William Silvast: Method and Apparatus for Debris Mitigation for an Electrical Discharge Source.

Retiree deaths

Marie W. Blythe (age 88) . . . . . December 15
David L. Chavez (94) . . . . . January 2
Don Williams (81) . . . . . January 3
Charles B. Frost (88) . . . . . January 3
Loren D. Blakely (81) . . . . . January 5
K. D. Boultinghouse (68) . . . . . January 5
Edmund S. Kuroski (87) . . . . . January 5
Josephine M. Gibbons (89) . . . . . January 7
Dorothy O. Taylor (84) . . . . . January 11
Gerald Ward Hinman (82) . . . . . January 22
John R. Biesterveld (74) . . . . . January 24
Manuel Cordova (76) . . . . . January 27
Thomas J. Hoban (80) . . . . . January 27
James M. Bedeaux (81) . . . . . January 30

Sympathy

To Mark Bishop (5934) and his wife, Melanie, on the loss of Melanie's father in Fort Worth, Texas, January 29, 2006.

For the record

In the article on clean coal in the Feb. 3 *Lab News*, a reference in the sidebar on page 4 to the amount of coal produced worldwide should have read "4.6 billion tons" or "4,600 million tons," not "4,600 metric tons." We misinterpreted the abbreviation "Mt."

Joint Sandia, LLNL, DHS bio-restoration demonstration helps large transport hubs prepare for bioterrorism

CLEAN SWEEP — A Sandia-developed system known as the Building Restoration Operations Optimization Model (BROOM) is among three technologies selected by the Department of Homeland Security to be included in a DHS Commercialization Pilot Project. Last month, it was a featured technology at a DHS-sponsored bio-restoration demonstration at San Francisco International Airport, where technicians are shown here checking for traces of a simulated toxic agent. (Photo by Bud Pelletier)

In the future, the nation will be better prepared for biological pathogen terrorist attacks against airports and other transportation facilities.

This improved readiness is thanks to a project funded by the Department of Homeland Security (DHS) and led jointly by Sandia and Lawrence Livermore national labs.

Late last month, a two-day demonstration event was held at the San Francisco International Airport's Terminal 2 for 120 officials from around the nation to lay out the response and restoration protocols to be undertaken if a biological attack occurred.

Sandia CaliforniaNews

The demonstration culminated the three-year interagency collaborative effort, focusing on critical transportation facilities.

Representatives and key collaborators came from the US Environmental Protection Agency, the Centers for Disease Prevention and Control, the San Francisco Department of Public Health, the Defense Department, the Defense Advanced Research Projects Agency, BART (Bay Area Rapid Transit), the California Environmental Protection Agency, and key personnel from other airports (O'Hare International, Dallas-Fort Worth, and Los Angeles International).

Under the Bio Restoration Demonstration Project, researchers from Lawrence Livermore and Sandia developed restoration plans and demonstrated how airports hit by biological terrorist attacks such as anthrax could be quickly decontaminated and reopened. As part of the demonstration, personnel donned haz-mat gear and analyzed areas of the terminal based on a mock scenario supplied by the FBI.

"A deliberate bioattack on an airport could have far-reaching impacts, not only in terms of public health but also in economics," says LLNL's Ellen Raber, a principal investigator on the project. "This project is all about being better prepared to respond quickly and effectively while protecting human health and the environment."

San Francisco International Airport was a partner in the three-year study. The national lab researchers used SFO's facilities to evaluate what would need to be done to restore an airport and how to minimize impacts on airport operations.

Raber's co-principal investigator, Sandia senior scientist Mark Tucker, says many of the ideas developed through the project could apply to the nation's other airports and other transportation systems, such as subways.

"One of the aims of the effort has been to use SFO as a case study to transfer lessons learned, templates, and technologies to other airports," Mark says.

"This demonstration project successfully integrated technologies and protocols, addressing many of the requirements that the Department of Homeland Security had identified as critical needs for airport restoration in the unfortunate event of a biological attack," says Elizabeth George, DHS deputy director for biological countermeasures.

Included in the airport restoration templates are protocols for characterizing an area through sampling and analysis after an attack; decontamination options; approaches for allowing public reuse of facilities; and the possible application of longer-term monitoring.

As a part of the approximately $10 million DHS project, researchers at Sandia and LLNL upgraded technologies to help shorten the cleanup times after a biological attack. Among the advances demonstrated at the airport were:

- A Geographic Information System–based indoor sample tracking system called the Building Restoration Operations Optimization Model (BROOM), developed by a team of Sandia scientists. The system permits public health authorities to collect samples in a more efficient manner, manage the large amount of data associated with samples collected from a contaminated facility, and visually display the extent of any biological contamination. Sandia's BROOM decision support tool, says Mark, is one of three technologies recently selected for the DHS Science and Technology directorate commercialization pilot program.

- A rapid viability test procedure, developed by LLNL researchers, to determine within hours, rather than days, whether anthrax spores are dead or alive — a capability that will greatly assist in the decontamination process by shortening cleanup timelines.

- Sampling methodologies developed by Sandia and LLNL to better understand the percentage of anthrax spores collected in samples (so public health authorities will have more knowledge about the extent of a contaminated area). This work also focused on how to sample more effectively using more statistical-based approaches for evaluating cleanups.

New Mexico and California

A new name: It's now called the Homeland Security and Defense SMU

By Mike Janes

Sandia's reorganization last summer merged the "old" Homeland Security strategic management unit (SMU), which focused on work for the Department of Homeland Security, with Labs programs in homeland defense and force protection for DoD and Labs facility security programs for DOE and other federal agencies. The new corporate-wide SMU is called Homeland Security and Defense (HSD).

"By combining our important DOE, DHS, DoD, and related security customers and their missions into a single business unit, we will be able to provide them a richer set of solutions, bring additional focus to Sandia's mission and capabilities, and contribute more coherently to securing the homeland," says Mim John, the VP responsible for the HSD SMU.

Mim says it made sense to fold the DoD and NNSA programs into the Homeland Security SMU by taking advantage of synergies and minimizing mission overlaps in the lab. Sandia's chem/bio, rad/nuc, and explosives countermeasures groups, for example, support both DHS and DoD customers, with very little variance between products.

"Dan [Rondeau] and Dennis [Miyoshi] have done a superb job of managing their business areas, so their addition to the SMU management structure bodes well for the future of our group," says Mim. Dan (5430) manages homeland defense and force protection programs, while Dennis (6400) leads the risk management and infrastructure protection area. Jill Hruby (8100) leads the SMU's catastrophic event mitigation mission area.

Though Sandia's Homeland Security and Defense SMU continues to face a number of challenges — including aggressive competition from other labs and industry, as well as persistent structural changes at DHS — Mim says Sandia remains steadfast with its long-term strategy for strengthening the Labs' relationship with the DHS.

The addition of homeland defense and force protection and physical security, for instance, will enhance the competencies Sandia can offer to DHS.

"We will continue to reinforce our successes and seek stronger ties with those offices where we have positive existing relationships," Mim says. "Our long-term goals, including Sandia's establishment as an enduring DHS partner, are still on record, and we don't plan on deviating from those objectives."

Brooks on Sandia and the reliable replacement warhead program

Note: During the Feb. 8 news media event, Albuquerque Journal *reporter John Fleck asked NNSA Administrator Linton Brooks about Sandia's role in the reliable replacement warhead — RRW — program. Here is Brooks' response:*

One of the things that we talked about [regarding] RRW is that it will improve both the manufacturing capabilities so that it can be modified and maintained easily, but also inherent security.


LINTON BROOKS

We don't talk a lot about specific details of inherent security, but we're spending huge sums of money in the aftermath of 9/11 because we know there are people who, if they can get their hands on a weapon, would be willing to die if they could take a bunch of Americans with them.

Right now our defense against that threat is to make sure they die before they get their hands on the weapon; that's a very hard challenge. And, there are things you can do to a weapon to give you a little more time once they get them. That is an area of Sandia's expertise, [one in] which I think there are some very innovative ideas. So that is one area where Sandia plays a unique role.

We hope the weapon of the future will have additional intrinsic security.

In addition, a physics package is of no particular value to you unless it's embedded in an overall system. We focus a lot on aging and maintainability questions around plutonium, because that's not usually as well understood [and] because we can't go set it off and make it go boom. The question of aging — there's a viewgraph somewhere that Sandia has in which they take one of our bombs and they show all the parts that are in that bomb — down in the corner is a little box which [represents] the Los Alamos or Livermore part — and everything else is Sandia. And all that's got to work and all that's got to meet the same kind of criteria that you can diagnose problems quickly, that you can repair them quickly — and so that's a niche for Sandia.

And then finally, we don't do calculations on fire so we can show you a really cool video; we do calculations on fire because weapons have to be safe, secure, and reliable. Improving the physics package — better design margins — focuses on reliable. I've already mentioned focusing on security. But understanding safety — there are some things that are sort of obvious; if you have insensitive high explosive, you're probably better off than if you have conventional high explosive — but how much better? How hard do you have to worry about fires? Well that depends on understanding fires at a level of physical phenomena. If you put pure plutonium in a fire, it aerosolizes, it burns, and that's a very, very, very bad thing. How well you really understand the consequences of that accident gives you some sense of how well you have to design [the safety aspects of the weapons].

The idea is not to do things less safely; but more effectively. That's a Sandia niche.

What we're doing on RRW is we're doing two competing designs; one developed by Los Alamos and Sandia/New Mexico and one developed by Livermore and Sandia/Livermore. It's easy to forget that the third word is Sandia National *Laboratories* — plural — [Sandia] is New Mexico-centric, but it's easy to forget that there's a very important part of what Sandia does that's out across East Avenue from Livermore [LLNL].

Finally, Sandia is really our expert on systems, on understanding how everything fits together, and at the end of the day, the vision I've set for you of a responsive infrastructure is a vision of a system. It's hard for me to believe that we'll get there without a lot of intellectual capital from this laboratory.

We're not at that stage yet because we're still focused on what an RRW might be able to do at the design level, but I think there's a huge role for Sandia in the project. We have the physics laboratories and then the engineering laboratories for reason. You really need both.

Red Storm

(Continued from page 1)

advanced computing. Red Storm and its sister computers at other NNSA labs, Tom said, are enabling a much-needed "reengineering of engineering" for the 21st century.

"In terms of raw speed in computing," Tom noted, "of the top six supercomputers in the world, the NNSA now has five and two of them are at Sandia [Red Storm and Thunderbird]."

With the power of the new generation of computers, Tom noted, scientists and engineers can "look at phenomena we were unable to do even a few years ago."

Tom cited the role of "some brave thinkers almost two decades ago," including many Sandians, whose vision of massively parallel computing and the ability to link thousands of processors to work simultaneously to solve huge problems has been fully vindicated.

Using the stunning graphics display capabilities of the JCEL Vislab, Tom showed two visualizations showcasing Red Storm's extraordinary capabilities. The first, showing the results of a 10-megaton nuclear blast to destroy an asteroid that may be on a collision course with Earth, depicts in vivid detail the asteroid coming apart and scattering into space in smaller (less dangerous) pieces. The second visualization, a sophisticated simulation of a fire event involving a nuclear weapon, showed streaks of fire racing across the giant Vislab screen. Tom emphasized that the videos were not animations (such as might be produced by a movie studio), but were true simulations derived from the physics of the phenomena being studied, simulacra of real-world events. There was, in short, a deep reality behind the beautiful images.

Ambassador Brooks, picking up on Tom's theme, said, "When I grew up, there were two ways to think about science: theory and experiment. Some of my colleagues in the scientific community now say that scientists in the future will grow up thinking there is theory, there is experiment, and there is simulation — three ways in which we advance scientific knowledge.

If that turns out to be true — and it probably will be — it will be the result, in part, of the kind of spectacular successes in simulation that you saw [in the visulazations]."

Brooks said the new era of supercomputers is the result of strategic decisions made at DOE. "A decade ago, we sat down as a community [i.e., weapons complex policy leadership] and said that we needed — in order to truly conduct the kind of simulation we wanted — to improve the state of the art in computing by a factor of a million.

"A factor of a million in anything is pretty spectacular; in fact we've done that in computing. And we tout that a lot in terms in terms of the physics of weapons, but it's equally important in the terms of basic safety and reliability, a part of the program that Sandia works on."

In discussing Red Storm's specific capabilities, Brooks noted that it performs 36 trillion operations a second, "a number that would have been inconceivable 20 years ago and regarded as a very considerable stretch even 10 years ago."

Noting that references to supercomputers often discuss just the raw speed — 36 teraops in the case of Red Storm — Brooks offered a more refined perspective.

"There are a series of so-called high-performance computing challenge benchmarks, and Red Storm was designed to focus on two issues. . . ."

In the two "bottleneck issues" it was designed to address — the efficiency in which the 10,000+ processors are connected and the speed with which the processors can access memory — Red Storm is now the fastest computer in the world.

"Red Storm," Brooks said, "represents work we did because we needed it for the stockpile, but it is advancing the state of human knowledge."

Safety

(Continued from page 1)

ing injuries requiring more than simple first aid in FY2004.

Recently, due to new safety initiatives, recordable injury rates have declined. Rates for YF2005 were 2.5.

Last year, as part of a "Best-in-Class" initiative launched to drive a change in safety culture and performance (*Lab News*, April 1), Labs management hired DuPont Safety Resources to help assess Sandia's safety systems, culture, and performance. DuPont Safety Resources is a spin-off company of Dupont that does safety consulting.

"We felt that improving safety was critical to our bottom line of national security," says Deputy Laboratories Director John Stichman. "Sandia is concerned about the safety of its employees both at work and home. The Sandia management team doesn't view safety simply as a matter of compliance. Safety is essential to achieving our mission. It is everyone's responsibility, management and the members of the workforce, to improve safety for all."

Labs Director Tom Hunter spoke about the importance of safety in an Oct. 20 message to all Sandians.

"As you know, one of the key themes of the laboratory is operational excellence. An important part of operational excellence is our focus on safety across the Laboratories," he said. "I have a deep personal belief and heartfelt responsibility to create an environment where every one of us goes home uninjured and without concern about an occupational illness. Our commitment is to attain Best-in-Class safety performance with a goal of zero job-related injuries and illnesses."

Understanding the need for the Best-in-Class initiative to be internalized and "driven from the top," the Labs Leadership Team (LLT) and executive management took some of the first improvement actions, including making ES&H (Environment, Safety, and Health) a regular topic of LLT meetings, sharing of experiences, and revising management notification process for injuries, among others.

Sandia's Best-in-Class initiative aligns with a broader charter for improvement — Lockheed Martin's Target Zero initiative under which Sandia, as part of the Lockheed Martin family, has committed to specific ES&H improvement targets.

DuPont was given two tasks: assess the current state of safety and propose recommendations for improvement and a path forward.

Assessment work began on June 1 with an online employee Safety Culture Survey to which more than 4,400 people responded, representing approximately 55 percent of the potential survey population.

Employees in Divisions 8000 and 10000 were not surveyed because they were given an earlier safety cultural survey as part of implementation of a behavioral based safety program.

In addition to the survey, DuPont representatives conducted 265 interviews from July 11 to Aug. 17 with Sandia executive leadership, management, technical and laboratory staff, scientists, technologists, ES&H staff, and contractors. They also visited facilities around the Labs, reviewed safety-related documents, and analyzed injury frequencies and worker compensation claim data.

Their biggest finding was that Sandia's present safety culture is in "an early stage and is driven by compliance."

"Sandia cannot significantly improve ES&H performance by continuing with a compliance-driven approach," the report says. Instead, safety must be thoroughly and comprehensively integrated into "all the work we do."

The report points to opportunities for improvement in several key areas, including

(Continued on next page)

Olympics

(Continued from page 1)

protests by activist groups and by environmentalists opposed to a high-speed rail line that would link Torino with Lyon, France.

"Italy has seen its share of large crowds," he says. "It will be like having the Pope's funeral every day for a month."

Nearly 2 million people attended the funeral; some 1.5 million are expected to attend the Olympics.

Norm's work for the Olympics began in 1998 when he was asked by the Secret Service to assist with security preparations for the 2002 Winter Olympic Games in Salt Lake City.

"There are a lot of similar concerns when comparing the Games in Salt Lake City and Torino," he says. "The US is at war now and the threat of terrorism remains high."

Norm says security has been a major concern at Olympic games since the 1972 Summer Games in Munich, where 11 Israeli athletes were killed after being taken hostage by militant Palestinians. In Atlanta during the 1996 Summer Games one person died in a bomb attack.

EVER-WATCHFUL — Norm Jarvis (left), a 20-year veteran of the US Secret Service before coming to Sandia, served under four presidents, including Bill Clinton, seen here greeting supporters.

Mass gathering events

Working on security preparations for mass gatherings and major events has taken Norm throughout the world including Europe, the Middle East, Asia, former Soviet block countries, Russia, and China.

He was assigned as the Secret Service lead to plan and implement the federal security effort for the World Trade Organization (WTO) Plenary in Seattle from June to November 1999. The event was dubbed the "Battle of Seattle."

"It was an unbelievable experience and not one I will soon forget, nor will the anarchists who view that melee as the model for civil unrest and demonstrations," he says.

Next March he will be coordinating with UNICRI and the Royal Canadian Mounted Police in Vancouver, B.C., for the 2010 Winter Olympic Games.

He will work as an advisor to the Chinese through UNICRI in preparation for the 2008 Summer Games.

In addition, Norm is working with the Netherlands' law enforcement institute in Amsterdam to review and improve national security initiatives important to the Dutch people. He will also serve as an advisor to UNICRI and several Eastern European agencies on a number of security initiatives.

Presidential detail

Since he worked close to Presidents George W. Bush, Bill Clinton, George H.W. Bush, Ronald Reagan, and Jimmy Carter, one might think that Norm has lots of stories to share. But he'd rather not. He says he likes to keep those stories to himself.

However, he can easily recall jogging with Clinton virtually every morning during his first term, and going on annual fishing trips with Carter on Ted Turner's ranches in Montana.

"People say that I can write a book," he says. "That would bring too much attention to those who are currently working for the current president."

One thing he does talk about are the sudden trips he had to take while working as an agent. He had only 24 hours to fly to Israel and prepare for President Clinton's attendance at the funeral of Israeli Prime Minister Yitzhak Rabin.

"Being a witness to many historical events has been a pleasure, sometimes dangerous, but always memorable," he says.

His work kept him busy and on the road, sometimes going three or four months without a day off. He says the job often demanded not only his time and dedication, but suggested a threat of sacrifice that had to be reconciled between him and his family.

"My wife is a blessing," Norm says. "She understood what my job was all about, and she never gave me the 'Secret Service or me' speech."

Norm and his wife Gayle raised two children throughout his 20 years with the Secret Service.

"They turned out to be pretty good adults," he says. His son is in law enforcement and is just about to graduate from college; his daughter is a member of an all-women's hockey team and works for a modeling agency.

"The Secret Service has had a tremendous impact on my life," he says. "It was an 'E' ticket ride."

Safety

(Continued from preceding page)

management practices, motivation and communication, and safety leadership skills of line management.

In the area of management practices the report notes that "compared to organizations with world-class performances Sandia's line management at all levels delegates too much ownership and execution of safety to the corporate ES&H office/professionals." Specifically, it says that management acknowledges a responsibility for ES&H, but performance accountability has been absent; process standards vary by division; Sandia lacks a site-wide structure, systems, and process for managing workplace safety; management desires to improve performance but in many cases lacks the specific skills and understanding of best practices; and leadership involvement in important safety processes is low.

Specific findings from DuPont's Safety Culture Survey

• A disconnect exists between views of executive management versus other levels. Executive management has recently become more active in safety processes.

• There is very little involvement of most employees and mid-level managers in safety.

• Overall, the responses are less positive than DuPont has seen from other organizations with the same level of safety performance.

Regarding motivation and communication issues, the DuPont study found that the "ES&H message has not reached the bulk of the organization." It says Sandia's safety policy is not well known and not used as a guiding document in performing work; most ES&H goals are not known below upper management; the frequency of safety meetings across the Labs is very low; involvement in ES&H activities and recognition of ES&H performance/achievements are low; the organization does not view working safely as a requirement to be employed at Sandia; and outside of executive management, much of the organization has not internalized the synergy between mission excellence and operational excellence.

In the area of safety leadership skills of line management, the report notes that the skill levels of line management vary with departments and divisions. Skills that vary include hazard recognition, safety observation and auditing skills, incident investigation (getting to the root cause, communication, and follow-up), safety meetings, role modeling and upholding standards, and effective coaching and motivation to build individual employee value around world-class performance.

The report suggests these obstacles can all be overcome to make Sandia a Best-in-Class institution by following three DuPont recommendations:

• Implementing an effective organizational structure to manage ES&H, and aligning responsibilities and accountabilities.

• Training all levels of management in safety management techniques.

• Creating, communicating, and gaining alignment around ES&H beliefs, values, and principles across the organization.

"The DuPont assessment gave us a picture of where we are at with respect to safety," says Phil Newman, director of ES&H and Emergency Management Center 10300. "We have a challenge ahead of us to achieve Best-in-Class."

In partnership with the mission organizations, Phil has initiated activities to improve the situation. Examples include the "Safety First" campaign, behavior-based safety efforts, ergonomics screening, and the new self-assessment process. Other Best-in-Class initiatives are underway or are being planned.

"We as a laboratory must join forces and make safety a top priority," Phil says. "We have to reach a state where we realize that all injuries can be prevented and that good safety performance is good business."

Key performance drivers, draggers

The DuPont Safety Culture Survey found both good attitudes, called performance drivers, and bad attitudes, performance draggers, towards safety at Sandia.

Some of the performance drivers included:

- 89 percent indicate they obey safety rules
- 82 percent believe that safety is designed into facilities and equipment
- 80 percent of the workforce say they are empowered to take action
- 93 percent of management is aware of the organizational safety performance

Some of the performance draggers included:

- Only 10 percent believe that all injuries are preventable, compared to 75 percent for best-in-class organizations
- 69 percent see safety as the number one or two priority compared to 98 percent for best-in-class
- 57 percent see the drive for safety excellence as helpful in other operational areas compared to 99 percent for best-in-class
- 52 percent say that line management is accountable for safety performance compared to 83 percent for best-in-class
- 45 percent are familiar with Sandia's safety principles compared to 99 percent for best-in-class
- 17 percent are involved in safety activities compared to 74 percent best-in-class
- Only about five percent indicate that activities in safety are recognized compared to 100 percent best-in-class.

EVERY MADE THING

From megaliths to monoliths: A survey of engineering

The engineering "profession," now differentiated into nearly 200 separate disciplines, originated in the Neolithic past. This invited article briefly explores the history of engineering, using the diversity of types as a guide.

By John Taylor

Material Engineers

The first engineers were materials engineers, flaking edges from stone cores, attaching them to shafts, and making needles, awls, bows and arrows, spears, and spear throwers from wood and horn (~750,000 BCE). They transformed hide, sinew, and plant materials into nets, ropes, bow strings, thread, and cloth. As they learned to control fire, they extracted ores and formed blades from alloys for plows, sickles, and swords. By manipulating mixtures of materials, these engineers produced new materials such as bread (~10,000 BCE), beer (~6000 BCE), papyrus scrolls (~3000 BCE), gunpowder (~200 BCE), and eventually paper (104 AD), plastics (1862), and composites (1959). Did I mention beer?

Early materials engineering

For additional perspectives on the history of engineering, some a bit contrarian, see The Axemaker's Gift *by Ornstein, Dewan, and Burke, and* Technology in World Civilization: A Thousand-Year History *by Arnold Pacey.*

John Taylor

Civil Engineers

The first engineer we know by name was Imhotep, an Egyptian pyramid builder (~2550 BCE). However, the earliest civil engineers were not monument builders, but the irrigators who channeled and stored water in southern Mesopotamia (~8000 BCE). About 3500 BCE, they also transformed simple rollers into axled wheels for carts and chariots.

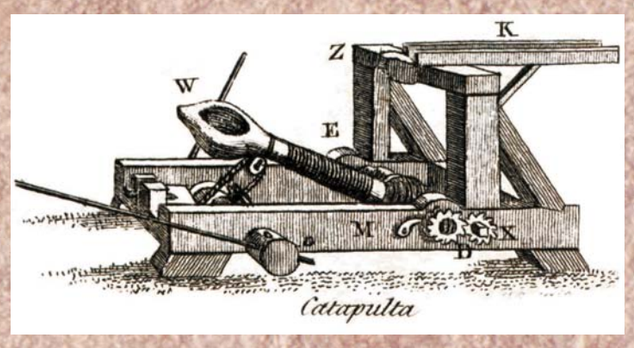
Imhotep was not even the first monument builder. About 4000 BCE, "British" engineers used the expansion of heated water, together with hammers, levers, wedges, ropes, and rollers, to quarry and move enormous megaliths to Stonehenge and Avebury.

The legacy of these early civil engineers includes the Temple in Jerusalem (19 BCE), the Roman public works system (road, sewers, and aqueducts), the Haggia Sophia (360 AD), the Great Wall (14th to 17th century AD), the Golden Gate Bridge (1937), and the Three Gorges Dam.

Inca-engineered swinging bridge

Military Engineers

Agriculture led to urbanization and organized conflict. Military engineers developed compound bows, long bows, crossbows, siege engines, sapping techniques, and Greek fire. Naval engineers combined oars, sails, and bronze rams to produce ancient battleships. Engineering in support of military operations continued as a major driver for technological advancement, leading to rockets (300 BCE), the stirrup (400 AD), firearms (16th century), submarines (1623), satellites (1957), stealth aircraft, and nuclear weapons.



Mechanical Engineering

As early engineers developed gears (1000 BCE), screws (1 AD), ratchets, and cams, they built systems powered by falling or flowing water, wind, draft animals, and slaves to run mills, raise ore from mines, and move water. These engineers also transformed Gutenberg's prototypical movable-type printing press (1448 AD) into a practical, affordable instrument. The resulting profusion of printed texts in Europe contributed to the Renaissance, the Reformation, and the Enlightenment.

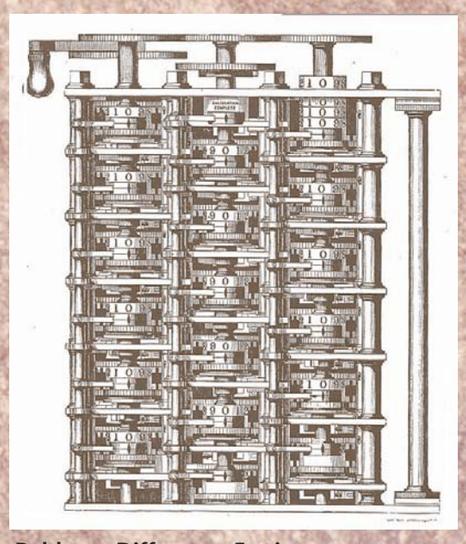
Hero's aeophile (~60 AD) achieved motion from heated water, but was considered mere entertainment until Thomas Savery proposed a working steam engine (1698). Steam engines drove the Industrial Revolution, powering automated devices that wove, drilled, dug, transported, and pumped. Nicolas Cugnot demonstrated a steam-powered road vehicle in 1769; the first steam-powered ship sailed (unsuccessfully) in 1783; and steam locomotives appeared in 1804. Inspired by Cugnot, Nicholas Otto (1876), Karl Benz (1885), and Gottlieb Daimler (1885) developed petroleum-fueled internal combustion engines as independent power sources for vehicles from tractors to tanks. In the late nineteenth century, the discipline of petroleum engineering emerged to refine and improve fuels for the thirsty engines of the burgeoning transportation and manufacturing industries.

Early steam locomotive

Information engineering

Control of information began with the Neolithic shaman's calendar stick and primitive sundials (3500 BCE) that permitted a few individuals to "control" time. Mechanical timekeeping devices, engineered in the 1300s to remind monks when to pray, were improved to facilitate celestial navigation. As timekeeping devices were combined with the compass (220 BCE), astrolabe (225 BCE), and sextant (17th century), eventually overcoming the problem of longitude (1764), profound changes in our understanding of the world were made possible.

The abacus (400 BCE), in conjunction with Napier's logarithms (1614), and Babbage's "Analytical Engine" (1837), led to ciphering machines and eventually the computer, first applied to cryptanalysis and in the development of nuclear weapons. Combining computers with solid-state electronics and satellite communication made storage, transmission, manipulation, and processing of enormous amounts of data a reality. The latest iteration of the information engineer's craft, the Internet (1968-1973), permits essentially instantaneous access to information on virtually any subject from almost anywhere in the world (caveat emptor!).



Babbage Difference Engine

Electrical Engineering

Humans always recognized, feared, and even worshiped lightning, but it was not until 1800 that electricity was harnessed by Volta. Telegraphs (1837), telephones (1876), and light bulbs (1878), powered by steam-driven generators, led to widespread electrification and the discipline of electrical engineering. Hertz's discovery of radio waves (1887) broadened these studies into electronics and communication engineering.

Shockley's invention of the transistor (1947) was another pivotal moment. By combining materials and electronics engineering, engineers miniaturized transistors. This miniaturization, combined with Dummer's concept of electronics as a "solid block with no wires" (1952), initiated solid-state electronics, eventually leading to integrated circuits (1959) for desktop computers, MIRVed warheads, and consumer products from digital watches to cell phones.

First transistor

In 2000, the National Academy of Engineering chose electrification, automobiles, airplanes, safe water supplies, electronics, radio and television, agricultural mechanization, computers, telephones, and air-conditioning and refrigeration as the "top engineering achievements of the twentieth century." You may already have generated your own list. However, whichever list you choose, from Neolithic toolmakers to the present day one sees the mark of the engineer: improving our ability to feed, clothe, and house ourselves; making us better fighters; giving us glorious religious venues; and always, always turning our ideas and dreams into reality.

John Taylor

A (very) few (of the countless) notable Sandia engineering accomplishments

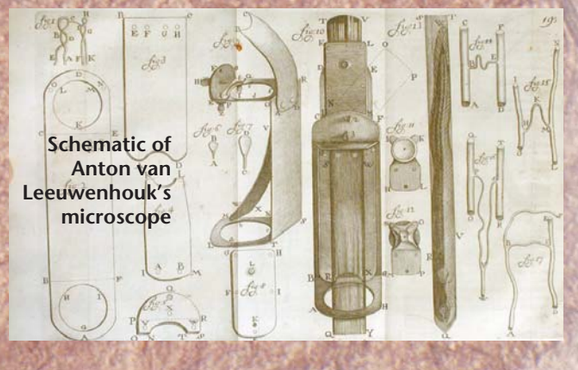
- The laminar air flow clean room
- μChemLab
- Rolomite switch
- Massively parallel computing
- Weapons system engineering
- Synthetic aperture radar

As one of the world's premier engineering labs, one with a legacy going back six decades, Sandia's list of engineering accomplishments is nearly endless, and the Labs' engineers add to that honor roll of achievement every single day.

Read Sandia Chief Engineer John Stichman's perspective on Sandia engineering on the next page.

Microengineering

When Anton van Leeuwenhouk constructed the first microscope (~1670), he opened the world of the infinitesimal. This led to an understanding of microbes and disease and facilitated the development of modern medicine. By marrying lasers (1958) to microscopes, microengineering was born, leading to bioengineering and genetic engineering. Sandia engineers would contribute to this microworld, making steam engines, electric motors, and optical systems visible only with the aid of van Leeuwenhouk's microscope!



Schematic of Anton van Leeuwenhouk's microscope

John Taylor, a nuclear engineer by training, is manager of ITS Strategic Office 303. He has a passion for history as well as engineering, and has written three books about New Mexico — *Bloody Valverde: A Civil War Battle on the Rio Grande, February 21, 1862, The Battle of Glorieta Pass* (co-written with Thomas Edrington), and *Dejad a los Ninos Venir a Mi (Suffer the Little Ones to Come Unto me): A History of the Parish of Our Lady of Guadalupe in Peralta.*

All illustrations from public domain sources

Eliot Fang to receive Asian American Engineer of the Year award

By Iris Aboytes

Eliot Fang of Computational Materials Science & Engineering Dept. 1814 will receive the Asian American Engineer of the Year Award during National Engineers Week, Feb. 18-25, from the Chinese Institute of Engineers (CIE/USA).

ELIOT FANG

Eliot immigrated to the United States in his early twenties after earning a degree in mechanical engineering at the National Central University in Taiwan. After college, he was an officer and instructor in the Chinese Army Ordnance School during his two-year government-required military service.

"Along with my parents, I came to the United States because we believed we could build a high-quality life," says Eliot, "starting with a chance to receive a level of education higher than what I had in Taiwan." His father was a pharmacist and his mother was an accountant. They set early education expectations for Eliot and his younger sister, Grace.

Enrollment at the University of California in Santa Barbara fueled Eliot's interest in materials science, particularly in the areas of material mechanics and stability of materials. He received his MS in mechanical engineering. He earned his PhD specializing in materials science, engineering, solid mechanics and structure, and thermal sciences. With his PhD in tow, he came to Sandia.

Today Eliot serves as manager of the Computational Materials Sciences and Engineering Department and is the program manager who oversees projects involving materials property and performance prediction.

He is leading the research and development efforts to apply coupled state-of-the-art materials models, with special emphasis at mesoscopic (or grain) scale, and high-performance computing to elucidate mechanisms of materials behaviors, describe details in materials processing, predict materials properties, and design new materials for desired performance through science-based tailoring of composition and microstructure.

The achievements of his team have advanced understanding of materials behaviors across various length scales — from the arrangement of the atoms at the atomic scale to engineering performance at the continuum scale.

He and his wife Jassie, who immigrated to the United States at the same time, have three precious jewels, their daughters, Erica, a college freshmen; Rebecca, a freshman in high school; and Rachel, a fourth grader.

"We speak Chinese at home," says Eliot. "Erica speaks Chinese very well, Rebecca does pretty well, but Rachel . . . !" he shakes his head and laughs. "They all spend too much time on the Internet chatting with friends."

Eliot and Jassie work to keep alive key Chinese traditions in their family. Church, school, and piano lessons keep the family busy and together. Eliot plays tennis every weekend and basketball during the winter in the Sandia Laboratories Basketball League. He is active in Sandia's Asian Leadership Outreach Committee and its mentor program, APS educational programs, and is a long-time council member of Albuquerque Chinese Baptist Church.

"My parents influenced me in making the choice I did," says Eliot. "Family values and education was what led me to pursue a PhD and commit to building a happy family. I hope my choices have influenced my kids like my parents' choices did me."

Eliot's entire family are US citizens. His parents live in Albuquerque. Only Grace is in Taiwan.

Plaque dedicated in honor of Ron Bentley and his work at Tonopah

A PLAQUE HONORING the "exceptional service" of the late Sandian Ron Bentley was dedicated Monday in a ceremony in the CNSAC auditorium. Sandia President and Labs Director Tom Hunter and Gloria Bentley, Ron's widow, here view the plaque. They were joined by family members (including Doug Bentley, son of Ron and Gloria and a Sandian in Dept. 5356), friends, and colleagues at the ceremony. VPs Steve Rottler and Jerry McDowell also spoke. The plaque will be installed at the operations center at Sandia's Tonopah Test Range in Nevada, where Ron long served as manager. A senior engineer who worked at Sandia for two months short of 40 years, Ron was assigned to the NNSA Office of Policy and Planning in Washington, D.C., at the time of his death, dealing with the test and evaluation of nuclear weapons. He died last June after a sudden illness. The plaque reads: "TONOPAH TEST RANGE OPERATIONS CENTER • The Tonopah Test Range Operations Center is dedicated to the memory of Ronald D. Bentley. • Champion of Nuclear Surety, Respected Range Manager, Extraordinary leader • In Recognition of his Exceptional Service in the national interest and unyielding dedication to the Nuclear Weapons Program and the Tonopah Test Range • With the respect, affection, and sincere gratitude of the entire Sandia Community" (Photo by Randy Montoya)

Sandia's rich engineering tradition, culture poised for 21st century challenges

By John Stichman, Sandia Chief Engineer, Deputy Labs Director and Executive VP

Borrowing a quotation from Theodore von Karman, "An engineer creates that which never was, but can be." Sandia has a rich history of doing just exactly this in the service of our nation's security. We base our engineering approaches on sound scientific foundations, exceptionally capable people, and excellent facilities, all dedicated to fulfilling the missions of the Laboratories.

The practice of such challenging engineering requires that we have available the best technologies, the ability to understand the realities of product performance through tests, and the ability to obtain insights beyond direct observation, through computational modeling and simulation. To this end, we have pushed the state of the art in microsystems, nanotechnologies, and many other essential technologies. We continue to support and enhance our ability to test and experiment, and we have made world-class advances in developing and applying computer modeling and simulation to our engineering tasks. When we have realized the fullness of our vision for MESA, we will see all of these elements working together for a synergistic benefit that could not be otherwise achieved.

Each of these innovations has already contributed greatly to fulfilling our mission, and we seek even broader application across the full set of our programs. To this end we have established lab-wide goals in engineering innovation and its scientific foundations, modeling and simulation, and in engineering processes. Furthermore, we are engaged nationally to further excellence in the practice of the most modern engineering and in engineering education.

NATIONAL ATOMIC MUSEUM

National Atomic Museum seeks volunteers

Volunteers are needed at the National Atomic Museum. The museum is open seven days a week, so almost any schedule can work. "Come join with others who are interested in the exhibits and mission of the NAM and watch us grow into our new museum," says the museum's volunteer coordinator, Dennis Verstynen. Interested? Call Dennis at (505) 254-2137 ext. 122.

Twelve teams named PQA Gold Award winners

Also awarded were nine Silver Awards, four Turquoise Awards

Twelve teams were named Gold Award winners in January during the 12th annual Sandia President's Quality Awards (PQA) program. Also given were nine Silver Awards and four Turquoise Awards.

Over its 13-year history a total of 683 teams have participated in the program, which included more than 13,000 team members. This year there were 25 awards with six at California and 19 at New Mexico.

The PQA Award program is a way to recognize, reward, and provide feedback to Sandia programs and projects. It's a hands-on approach toward understanding how to use business and quality principles to improve Sandia's work with government, industry, and academic partners. PQA winners include Sandia employees, contract employees, stakeholders, and in some cases customers. The program is intended to be compatible with all customer-required quality systems at Sandia, including ISO 9000:2000 and Malcolm Baldrige.

A two-step process determines award levels. Examiners recommend an award level based on a review of the application to the quality criteria. The applicants' vice-president reviews the recommended winners for impact and value added.

Teams winning Gold Awards must have achieved and sustained excellent results relative to customer requirements. Silver winners had to achieve and sustain very good to excellent results, and Turquoise winners had to show very good results relative to customers' requirements.

Labs President and Director Tom Hunter said at the ceremony that programs such as PQA are a critical part of the journey for Sandia's future.

"As we move into the future, we need to focus on quality, external recognition of our quality efforts, and establishment of benchmarks that are internationally recognized," Tom said. "We will be judged by our impact on the nation and by the quality of our results."

Beginning immediately below are the lists of winning teams and team members, along with a few of the team photos, randomly selected.

Gold President's Quality Awards

Course Subscription Application Team

The Course Subscription Application Team provides the Sandia workforce with a mechanism of subscribing to courses in such a way that they will be notified when a subscribed course session has been scheduled. This service enables Sandia personnel to enroll in courses that will enhance their job performance and career development.

Team members: Lorraine West (3551), Pat Willan (3523), Amanda Saba (3551), Jessie Black (4521), Juanita Padilla (3523), Linda Stackpole (35201), and Mary Compton (4519)

THE FORKLIFT SAFETY RODEO EVENT TEAM

The Fifth Annual Forklift Safety Rodeo Event Team

The annual Forklift Safety Rodeo is in its fifth year. The event showcases the skills and training of Sandia forklift operators and recognizes the vital role that forklift operators play in helping the Labs accomplish the many mission goals and supply chain management.

Team members: Elizabeth Carson (10262), Gabriel King (10264), Anthony Leyba (102641), Brad Lackey (10327), Darrell Fong (10322), Ernesto Sanchez (10322), Lewis Marlman (10264), Mark Warner (10322), Rebecca Naranjo (102631), Willie Johns (10322)

Enterprise Location Team

Enterprise Location Team established an integrated, comprehensive, authoritative repository containing information on locations where Sandia has people, property, or potential hazards. The approach addresses versioning, history, and layer relationships; the scope encompasses all sites where Sandia does business. Major applications that handle people, property, and hazards now use the data.

Team members: Chris Morgan (4333), Carolyn Quinn (4014), Andrea Long (4300), Bonnie Hammond (10761), C. Salim Zamir (5743), David Schoch (4538), Linda Garcia (4538), Robert McCornack (4529), Roger Rizkalla (10825)

Cross-Functional Contract Closeout Process Team

The Cross-Functional Contract Closeout Process Team successfully designed and implemented an integrated, electronic closeout application that satisfies corporate compliance requirements regarding the timely completion as well as the monitoring and tracking of auditable contracts. This application integrates contract audit, procurement, accounts payable, and accounts receivable processes which in turn ensures that Sandia resolves all questioned costs to include collections of any monies due Sandia.

Team members: Susan Schear (10531), M. Louise Britton (10762), Bertie Denman (10221), Carla Bell (35210, Delia Marie Madrid (10503), Elizabeth Rance (10224), Faye Long (10242), Jacquelyn Rambo (10531), Jana Lichlyter (10503), Jo Ellyn Cunningham (10241), Julia De La Cruz (10224), Kandice McDonald (85234), Laurie Duvall (60360, Lucille E. Shaw (5053), Margeri Martinez (10246), Nora Armijo (10222), Patsy Jones (12820), Patsy Perschbacher (10507) Rachel Wilson (10872) Richard Baird (10756), Shari Garcia (10531), Suzanne Simpson (10756), Virginia Lujan (10224), William Shiffrar (2712)

Laser Dynamic Range Imager for NASA Space Shuttle Program Return to Flight Team

NASA requested that Sandia provide its patented Laser Dynamic Range Imager (LDRI) sensor and all necessary ground-based image analysis to detect damage to the Shuttle's thermal protection system. Sandia delivered all systems and analysts for the first and very successful Return to Flight mission, STS-114 in July 2005.

Team members: Robert Habbit Jr. (2624), Lynn Fugelso (12342), Aaron Niese (2623), Bob Nellums (2624, Charles Graham (2666), Colin Smithpeter (2615), David Armistead (5622), David Karelitz (4326), David Peercy (12341), Dennis Clingan (2624), Erik Fosshage (12342), Gus Rodriguez (2624), Joe Borrego (1734), Joel Jorda (2624), John Sandusky (2624), Jose Rodriguez (2624), Kenneth Gwinn (1526), Lance Baldwin (1639), Larry Dalton (2622), Linda Gilkey (2026), Mark Heying (2624), Matthew Montano (1711), Megan Slinkard (2661), Patricia Tempel (2622), Randal Lockhart (2621), Richard Taplin (2624), Ron Akau (1516), Ronald Ward (10827), Steve Gradoville (2661), Steven Lebien (5919), Thomas Casaus (2624), Timothy Jones (1526), Todd Pitts (2624)

Neutron Generator Engineering Authorization Work Cell Team

Centers 2700 and 2900 implemented an Engineering Work Cell using Lean/Six Sigma methodology to better serve customers on engineering authorizations. The Work-Cell incorporates principles of co-location, continuous flow, standard work, and 6S. Significant savings include: span time — from 33 to 2.5 days; re-work — eliminated; and resources from eight to three. The team continues to improve the process and to share Lessons Learned.

Team members: Tamara Deming (2738), Maria Galaviz (2738), Alan Parker (2712),

HEALTH MONITORING OF THE SPACE SHUTTLE TEAM

Carmen Lucero (2995), Carolyn Smith (2995), Cathy Vortolomei (2995), Debbie Stephens (2995), J. Anthony Wingate (2712), Jennifer Simmons (2995), Joanna Lewis (2712), Joe Santana (2997), Lauren Hancock (2995), Norman Stephens (2997), Richard Graham (2995), Richard Harris (2997), Rosie Jennings-Williams (2995), Sandy Tonnesen (2912)

Health Monitoring of the Space Shuttle Team

Following the break-up of the space shuttle Columbia, *NASA conducted a nationwide search for technology to monitor the health of the Shuttle heat shields. Sandia developed a robotic, ultrasonic system that not only met NASA's stringent performance criteria but also could be quickly integrated into the Shuttle Orbiter Processing Facility.*

Team members: Dennis Roach (6252), Tonimarie Dudley (6032), Kirk Rackow (6252), Phillip Walkington (6252), Richard Perry (3820), Ronnie Albers (2433), Boeing, NASA, Oceaneering Space Systems

Test Capabilities Revitalization (TRC) Phase 1 Construction Team

The Test Capabilities Revitalization (TCR) Phase 1 construction project provided facilities and capabilities

(Continued on next page)

NEUTRON GENERATOR ENGINEERING AUTHORIZATION WORK CELL TEAM

Mileposts

New Mexico photos by Michelle Fleming
California photos by Bud Pellitier

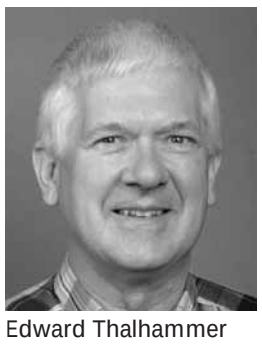

Keith Almquist
30 241

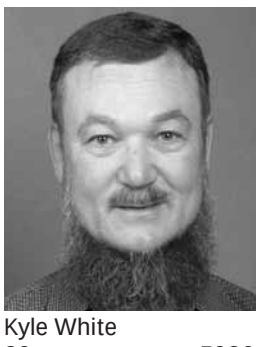

Kent Biringer
30 3821


Conrad Lucero
30 2955


Thomas Lutz
30 1658


Mark Soo Hoo
30 6952


Edward Thalhammer
30 5523


Kyle White
30 5936


Quenton Mckinnis
25 8231


Dwight Miller
25 6642


Michael Quinlan
25 10820


Theodore Wrobel
25 1343


James Porter
20 6452


Geneva Sachs
20 12305


Bradley Smith
20 245


Daniel Sprauer
20 5348


Daniel Barela
15 4211


Vincent Hietala
15 17121


Michele Lesher
15 4538


Linda Houston
15 8520


Barb Troen
15 8528

PQA winners

(Continued from preceding page)

vital to Sandia's Defense Programs mission. TCR revitalized the Aerial Cable Facility that performs pull-down and drop tests. Phase 1 also built the new Thermal Test Complex, adding fire test capabilities available nowhere else in the world.

Team members: Paul Schlavin (10824), Scott Rowland (10824), Allen Smith (1532), Bill Johns (12905), Brian Penner (12920), Christine Cooper (2029), Chuck Thompson (10826), Dann Jernigan (1532), David Hofmann (108273), Dennis King (6211), Edward Garavaglia (1534), Frank Scott (10827), Gina Sanchez (10872), James Nakos (1532), Jason Caspersen (10826), Jeff Porter (10827), Jerry Francis (10826), John McFarland (10826), Kable Oldham (12920), Kevin Ward (1677), M. Anthony Chavez (10824), Marvin Roybal (1532), Michael Dexter (108261), Michael Kupay (10546), Paul Silva (1082730, Shahzaman Jaghoory (12920), Sheldon Tieszen (1532), Thomas Kevin Blanchat (1532), Todd Johnson (12920), Wayne Evelo (10730)

MC4300 Neutron Tube Product Realization Team

The MC4300 Neutron Tube Product Realization Team project is developing and producing a new neutron tube meeting requirements for five different systems, in half the volume of the existing tube. With a simplified design, reduced part number, and process improvements, the team exceeded performance requirements. Several of the team's improvements will also be introduced to existing tube manufacture.

Team members: Carla Busick (2561), Maria Walsh (12342), Antonio Lara (2719), Ben Cole (2564), Charles Jojola (2997), Dolores Sanchez (2719), Evan Dudley (2722), Gary Pressly (2722), Greg Neugebauer (2561), Heny Bundy (2722), Jason Koski (2726), John Brainard (2564), Juan M. Elizondo-Decanini (2564), Keith Meredith (2722), Lenore Partridge (2719), Lisa Walla (2722), Marabeth Kellerman (2722), Matthew Senkow (27221), Melissa Feldner (2712), Nayeli Chavira (2714), Pierrette Gorman (2722), Richard DiPrima (2722), Ron Thomas (2726), Rosalie López de Spinello (27221), Tom Dickman (2717)

SNL/CA Environmental Management System (EMS) Team

The Sandia/California Environmental Management System (EMS) Team put together an EMS program that implements Sandia's corporate EMS requirements as they relate to Division 8000. The program incorporates the requirements of DOE Order 450.1 and follows the international standards for environmental management systems, ISO 14001.

Team members: Gary Shamber, Barbara Larsen, Janet Harris, Laurie Farren, Leslee Gardizi, Mark Brynildson, Robert C. Holland (all 8516)

W87 Flight Test Unit #19 (FTU-19) Assembly Team

The W87 Flight Test Unit #19 (FTU-19) Assembly Team successfully executed an aggressive schedule for assembly of FTU-19. Their success was achieved with high levels of teamwork, coordination, and skilled execution. The team met customer needs for performance, quality and timeliness by exemplifying the highest standards of integrity and dedication.

Team members: Scott W. Anderson (8231), Veronica Harwood (8231), Benjamin Markel (8231), Catherine Schmitz (8236), Donald Osbourn (8236), Gary Kirchner (8235), Gregory Marc Valdez (8233), Judy Lau (8231), Kiet Tieu (8235), Lee Rieger (12341), Paul Lowe (8235), Quenton McKinnis (8231), Roman Romond (8231), Seung Choi (8235), Thomas Clark (8235)

JTA Lean/Six Sigma Event Team

The JTA Lean/Six Sigma Event Team is a cross functional team that represents multiple facets of Sandia, Kansas City, Pantex, and NNSA. Using Lean/Six Sigma tools and principles, the team achieved the transformation necessary to reduce the JTA development cycle to three years.

Team members: John Wheeler (8231), Larry Luna (2132), Anthony Tafoya (5334), Bart Wells (2990), Brent Blankenship (2132), Brian Sweeney (8230), Bruce Brunett (8233), Bryan Adams, Dan Cantu (2138), Dean Ilinger, Dennis Mowry (2952), Dennis Terrell (2990), E. Paul Royer (2560), Jim Lynn, Ken Franklin, Kurt Berger (8231), Mark Martin (2565), Michael Brinson, Michael Newman (2132), Paul Jarnevic, Rex Eastin (8232), Veronica Harwood (8231)

PQA Silver and Turquoise award winners

Here are the Silver and Turquoise winners:

Silver Award winners: Second Annual Sandia National Laboratories Lean Six Sigma Summit Team; NWSMU Correction Action Tracking System (CATS) Development and Implementation Team; Implementation of the ISO 9001:2000 Standard in Procurement Team; Complaint Treatment of Mixed Waste with No Disposal Pathway Team; Institutional General Plant Project (IGPP) Program, Buildings 729 and 758 Team; Procurement Reorganization Team; Port of Antwerp Megaports Initiative Team; Division 8000 Performance and Compensation Review Process Team; and W87 JTA4 Design Team.

* * *

Turquoise Award winners: K-12 Computer Donation Program Team; Marx Annex Bldg. 983 Lean Six Sigma 6S Team; Annual Physical Property Inventory Process Team; and Collaboration Roadmap Team.

Tom Hunter joins President Bush in panel discussion at Intel on America's global competitiveness

By Ken Frazier

PRESIDENT GEORGE W. BUSH and First Lady Laura Bush listen to a point by Sandia Labs Director Tom Hunter (second from right) during a forum at the Intel facility in Rio Rancho. At right is Matt Pliel, a TVI faculty member and principal investigator for the Southwest Center for Microsystems Education. (Photo by Tony Bonanno Photography)

Less than six months after President George W. Bush's memorable visit to Sandia to sign the Energy Policy Act of 2005 (*Lab News*, Aug. 19, 2005), the president was back in the Albuquerque area, and Sandia Director Tom Hunter found himself once again participating in a presidential event.

This time it was in a panel on the president's new American Competitiveness Initiative conducted at the Intel New Mexico plant in Rio Rancho. Tom was invited to participate in the 55-minute-long, locally televised panel discussion Feb. 3 along with Intel CEO Craig Barrett and several local educational leaders and students.

President Bush himself led the discussions, which centered on boosting US technological competitiveness and math and science education. The initiative, announced by Bush in his State of the Union address three nights earlier, grew out of recommendations of a National Academy of Sciences study led by former Lockheed Martin CEO Norm Augustine and was encouraged and "fine-tuned" (in the president's words at Intel) by New Mexico's two US senators, Pete Domenici and Jeff Bingaman.

In introducing Tom Hunter, the president jokingly recalled the tour Tom gave him of Sandia's solar thermal test facility last August. "The last time I was with him," said the president, "we were standing out kind of in a desert area, and he fired up one of these new solar research [here he paused] beams." That provoked some laughter. "All I can tell you is that I was glad I wasn't at the other end of the beam." That brought more laughter. He quickly added, "They're doing some good stuff when it comes to research and development at Sandia."

"We have just begun to realize the important power of these large supercomputers that are now present everywhere. As I sit here today, a few miles away at our laboratory there's a computer doing something like 40 trillion calculations every second. And that allows people to realize and see things they could never have dreamed of years ago."

Labs Director Tom Hunter

"Welcome," Bush said to Tom. "Thanks for being here. What's on your mind?"

Here is a slightly edited transcript of Tom's comments to the President:

Tom Hunter: Thank you, Mr. President. Well, I should say it's a real pleasure today to represent about 10,000 of the most committed and best men and women in the role of national security [R&D], support for our economy, and our energy future. It's probably important to say, though, that this initiative could not have been more important to the future of the country, and could not be more important to me.

As I look back on my life, I was born in a place and time when opportunities weren't that great. I was a middle child of a recently widowed mother, and the economic conditions were not good. I ended up through that period having a mother who loved me and encouraged me about some things — education and hard work. And because of that I was able to arrive at a position where I can represent this fine institution and be seated with you today.

And it makes me feel good that those values of education are so important in this initiative that you have. As we look forward, though, which is going to be absolutely critical to this country in how we work across the globe, we're going to do some new thinking. It's going to be necessary to not look back at how we have done science and engineering in the past, but look ahead and ask questions about, how can we encourage scientific thought from its very roots? How can we reengineer, if you will, engineering? How can we say there are different ways to do things than we've done in the past?

We have just begun to realize the important power of these large supercomputers that are now present everywhere. As I sit here today, a few miles away at our laboratory there's a computer doing something like 40 trillion calculations every second. And that allows people to realize and see things they could never have dreamed of years ago.

We're also seeing now — Intel being one of the most prominent examples [of private sector firms involved in this transition] — what I call small, smart things that will redefine how all of our lives work, from our ability to understand the functions of the human body to how we process information, to how we provide lighting — all those questions. And, finally, looking very deep at the atoms, themselves, and asking, how can we build them up in a way that allows new material to be created? This nano-technology is opening a new frontier.

So as we think about educating this next generation of scientists, engineers, and technicians, it's really critical that we think differently and [inventively] about how we can have a prominent role in those areas across the globe.

Our view of ourselves and our institution is to help partner with all the people that you see at this table, and to try to bring forward new ways to look at education and support for education and be prominent in that. We have a large number of partnerships to do so, not only here, but with every university across the country. And I'm proud to be able to be a part of that, proud you called such prominent attention to it, and thank you for being here.

[Bush then marveled at how fast technology advances — people can now watch DVDs in their cars while motoring across Texas — and asked Tom to give an example for the audience of a government-funded research area that has an application to peoples' lives.]

Tom: Well, let me give you an example. If you look at the lights in this room or other places, you'll find that about 20 percent of electricity is devoted to lighting, just to make light, at night and as we see today. If you could understand how to change the atoms in one of these little photodiodes — and rearrange them in such a way that you could put in a little electricity and out would come light, then you could end up, by a factor of 10, changing the energy consumption in lights all across the globe.

The issue, of course, is how you make white light. Today we can make lots of red light and other colors, but we can't make white light. So with research, going in and bending the atoms around a bit, we can figure out how to make that lighting just so much more efficient. And I predict that, like DVDs in the cars across Texas, you'll see lighting in a few years that is all done by other means, saving us an enormous amount of energy.